TYPE I PROGRESS REPORT
May 8, 1973

Title: Recognition of the Geologic Framework of Porphyry Copper Deposits on ERTS-1 Imagery

Principal Investigator: John C. Wilson, PR 510

Contract: NAS5-21769

Objective:

The purpose of the investigation is to examine the general hypothesis that mineral deposits of the copper/molybdenum porphyry type occur in a characteristic geologic setting which is recognizable in the surface data on space acquired imagery.

Summary of Accomplishments During Reporting Period:

The collection of geologic data on each of the six test sites was essentially completed and compilation of base maps for comparison with, and correlation to, ERTS imagery begun. Compilation and adaption of geophysical data is in progress. Aeromagnetic, gravity and side-looking radar survey maps have been secured for parts of the Ok Tedi and Mt. Perry test sites. Two low altitude aeromagnetic surveys in the Ely test site area were upward continued by computer methods to facilitate mosaicing with USGS high altitude survey results, thereby increasing available coverage by some 2,000 square miles.

Preliminary geologic interpretation of the ERTS imagery over all six test sites continues. In the Ely test site area inspection of the geologic base in conjunction with satellite imagery has emphasized Tertiary structures. Of particular interest are a northwest set of high angle faults which effectively offset the general north trend of the ranges. Oligocene volcanics are preserved in the grabens of the northwest structures. The older Mesozoic folds and the thrust structures are abruptly terminated by these faults which cut the ranges at an oblique angle. Termination of linear ranges is in some instances caused by these faults. Late Tertiary calderas are particulary well defined on the satellite imagery in southern Nevada. Similar appearing circular volcanic fields in eastern Nevada are remnants of extensive welded ash flows preserved in down faulted blocks. Most of the linear physiographic features observed are related to mid-Tertiary or later structure. The Mesozoic fold structures show as gentle curves in the Confusion Basin, Utah; in southern Nevada; and in eastern Nevada.

ERTS color composites were combined from the four bands by means of a mini Adcol of all the test sites except Silverton, Colorado. These 9" x 9" color prints are useful in both mapping tectonic features and detecting possible areas of regional hydrothermal alteration by subtle changes in the hue of the colors.

Problems:

1) The mislocation of center latitude and longitude coordinates on imagery has required the use of Operation Navagation Charts for replotting center coordinates by matching geographic features in order to provide mosaic control.

2) To obtain the image sharpness required for some uses, it has been necessary to make prints using Kodabromide f-3 paper to replace the polycontrast RCN paper prints.

3) Only marginal coverage has been acquired over the Mt. Perry, Australia test site owing to almost continual heavy cloud cover. The cessation of additional coverage over this area owing to malfunction of the remaining VTR precludes the improvement ov coverage here and at the Ok Tedi test site.

4) The payment procedure provided in the terms of the contract is apparently ineffectual as invoices submitted for payment on January 22 and April 16 have not prompted any response.

Publications:

None

Recommendations:

None

Standing Order:

The standing order change requested in the last progress report to accomodate the shift in the Colorado test site from Leadville to Silverton was affected at the end of the current reporting period.

Image Description Form:

None

Data Request Forms:

1) Imagery over the Tanacross test site was requested April 19.

2) Some imagery omitted from standing order shipments and replacement prints for some too dark to be used were requested by April 19 letter.

Schedule:

No changes

Funding and Personnel:

No changes

Plans for Next Reporting Period:

1) Continuing analysis of ERTS-1 imagery and compilation of observed features on base allowing comparison to known mineral occurrences, geology, and geophysics. Map compilations are being reduced to 1:1,000,000 scale.

2) Aeromagnetic data compilation will continue and interpretation for comparison to ERTS imagery may be initiated.

3) A meeting at Earth Satellite Corporation's facilities in Berkeley, California is planned in the next reporting period for the purpose of scoring their "naive" interpretation against readiness files compiled by coinvestigators. Image enchancement devices will be used by investigators to aid in interpretation of problem areas.